Grade: First Grade
Domain: Counting and Cardinality
Concept: Decomposing/Composing Numbers to 19
Lesson addresses: Target Concept
(Highlight one) Prior Learning
Misconception

Composing and Decomposing to 19

Student Probe

Ask the student, "What is 5 + 5?" Most students will say "10." Ask them how they know. Then say, "so if 5 + 5 is 10, what is 5 + 6? If the student begins counting on his fingers to find the solution, that student needs to go back to compose and decompose to 10/subitizing. If the student successfully answers and can explain, then ask, "What is 10 + 5"? The student should say, "15". Ask how they know, then say so if 10 +5 is 15. What is 8 + 5? If the student has to count on from 8, the student needs this lesson.

Lesson Description

This lesson is intended to help students continue to gain a strong mental/visual framework for how the numbers in their teens function and how they are represented.

Rationale

Being able to compute mentally and flexibly based on the numbers given enables students to access concepts in higher level mathematics including non-routine problem-solving. When students are fluent with the relationships of numbers and can break them apart at will easily, the attendance to the problem or to the mathematical concept becomes the focus not the computation. It is critical for students to have a facility with number at an early age in order to gain access to more and more mathematics.

Preparation

Prepare a set of dot cards, double ten frames, interlocking cubes, pencil and paper

Lesson

At a Glance

What: Students will work with quantities 11-19. In this lesson they will use double ten frames to compose and decompose the number 15 with an emphasis on making 10. The written representation will also be used and discussed.

Common Core Standards: CC.1.OA.6 Add and subtract within 20, demonstrating fluency for addition and subtraction within 10. Use strategies such as counting on; making ten (e.g., 8 + 6 = 8 + 2 + 4 = 10 + 4 = 14); decomposing a number leading to a ten (e.g., 13 – 4 = 13 – 3 – 1 = 10 – 1 = 9); using the relationship between addition and subtraction (e.g., knowing that 8 + 4 = 12, one knows 12 – 8 = 4); and creating equivalent but easier or known sums (e.g., adding 6 + 7 by creating the known equivalent 6 + 6 + 1 = 12 + 1 = 13)

Mathematical Practices:
Attend to precision
Look for and make use of structure

Who: Students who have no strategies for computing mentally and who need work with place value

Grade Level: First Grade

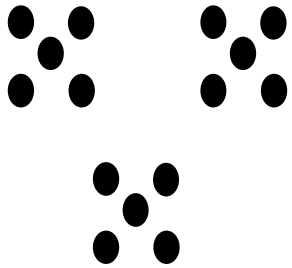
Prerequisite Vocabulary: teen numbers, double ten frames

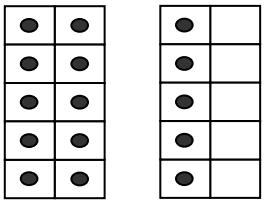
Prerequisite Skills:
Rote sequence of counting numbers to 30, one-to-one correspondence, ability to orally match a numeral with a quantity to 10, knows and can explain all the combinations to 10

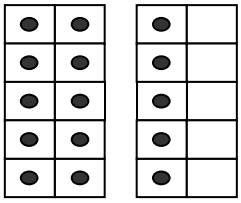
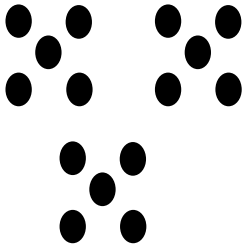
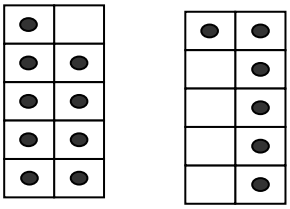
Delivery Format: Individual, small group

Lesson Length: 30 minutes

Materials, Resources, Technology:
Dot card arrangement for 15
Double ten frames with all arrangements for 15
Double ten frame templates for students

The teacher says or does…	Expect students to say or do…	If students do not, then the teacher says or does…
1. Show the card with 15 dots arranged in groups of 5 Show the pattern for 2 to 3 seconds and then ask: How many dots did you see? *Show it again if necessary but avoid showing it for more than three seconds. You don't want the child to count the dots.*	"15" 	Show the card one more time and then make a determine about whether the child needs to go back to the subitizing lesson which is a pre-requisite.
2. Exclaim: How were you able to know that so quickly? You didn't have time to count by ones! (*Do NOT have students prove their answer is correct by having them count by ones. This defeats the purpose of trying to have them see the number a unit.)* Ask: How were the dots arranged? OR What did the dots look like?	I saw "5 + 5+ 5" OR "I saw 3 fives and that's 15" OR "I saw 10 and 5 more Etc.	What did you see that made you say 15? How did you know there were 15 and not 10? Show the card again and have the child point the collections of 5 as he/she counts by 5s.

The teacher says or does…	Expect students to say or do…	If students do not, then the teacher says or does…
3. Ask: How could we write that?	" five plus five plus five" "five groups of 5" "ten plus 5"	What did you see? How many dots? How many did you see first? Then?
4. Write what student says; for example, expressions: 15 5 + 5 + 5 and add or we have 3 fives which we write 3 x 5 List all expressions	Student copies or watches And is able to point out where the numbers correspond in the model	Have the child build the arrangement with counters (if two-colored, make sure the child only uses one side or the other so color does not interfere).
5. Now flash the student a double ten frame with 15. and ask how many dots? 	15	Show the card again.
6. Ask: How do you know?	I saw 10 and 5 or I saw 5 + 5 + 5, etc.	Flash the card again.
7. Ask: How could we write that?	10 + 5 Or 5 + 5 + 5	Student watches you write it.
8. Turn the card over for good (so student can see it) and ask the student: Can you show me where ten is represented in the dot cards? Can you show me where the 5 is? Is there another way to see 10 or 5?	The student points to the 10 frame with all the dots to show the "10" and points to the 10 frame with "5" to show "5" The student also points out that 10 could be 5 from one dot card and 5 from the other dot card. Probe for other variations. What else?	Ask: where are there 10 dots. Flash it again quickly and ask: now think, where did you see ten dots?

The teacher says or does…	Expect students to say or do…	If students do not, then the teacher says or does…
9. Put both dot arrangements side by side and compare.   Ask: How are they the same? How are they different? Probe for many ideas.	Examples: <u>same</u> They both have 5s. They both have 10 and 5. They both have dots. <u>different</u> these dots are in a ten frame these are not the ones in the ten frame are arranged in a line (vertically) and the other ones are bunched in a square with one in the middle the ten frame has empty spaces showing 15 is 5 less than 20	Ask probing questions: If you were going to ask someone (who can't see them) to draw both arrangements, what would you say to help them understand how they are different? How are they arranged differently? Which do you like better? Why? What does the ten frame show that the other dot arrangement not show?
10. Let's look at some more double 10 frames. (Flash another one.)  How many dots?	"15"	Flash the card again. Ask the student if a ten frame is completely filled, how many dots. (if the student has to count on fingers to add 10 and 5, make a note to go back to the lesson about teen numbers because the student doesn't know the pattern for adding 10 and some more.)
11. How do you know so quickly?	I saw 9 and 6 I saw one dot was missing from the ten frame so I made a full ten frame and then there were 5 more and 10 and 5 make 15	Have the child make the double ten frame arrangement and make observations. Ask: So what do you notice? How could I know this one quickly without counting? What could I look at?

The teacher says or does…	Expect students to say or do…	If students do not, then the teacher says or does…
12. Let's see how to write that. So what did you do again? Student should explain while you record and support their efforts. 9+6 = 9+(1+5) = (9+1) +5 = 10+5= 15 Ask: Why was moving that one dot over to make a ten an easy way to know how many dots?	First there were 9 dots and 6 dots and then I took one of the dots from the 6 dots and added it to the 9 dot to make 10. Teacher asks: Did you mentally move that over? That's a great strategy for making 10. Does that make it easier for you?	Flash the card again and determine if the student needs to use the double ten frame template to make the arrangement FIRST instead of afterwards.
13. Let's show how that works physically with our double ten frame. Please make the arrangement of 9 and 6 just like it is on the double ten frame card. Now as we read our equation, let's act out what you did in your mind. First you……prompt the child to begin.	Student makes the double ten frame arrangement and then walks through the steps corresponding each step with the written equation.	Have the student also make the quantities using interlocking cubes and corresponding that to the pictures and the equation.
14. Now, I want you to show me some different arrangements of 15. For instance instead of 9 on this ten frame and 6 on this one, I could have 8 on this one and how many on the other one? How do you know?	"7" Because you have to add the dot you took off the 9 to 6 dots which makes 7.	Act out what happens again and have the student orally talk about what happened.
15. Here is a sheet with blank ten frames for you create other ways to make 15. Record your ways on this template and write the corresponding expression		

Teacher Notes

The student will need many opportunities to numbers to 15 in this manner – making a ten. Discussion of how and why and student knows something is critical. Also, make sure the student understands where in the model each abstract numeral or operation is occurring. Two color counters can be strategically used so that one ten frame is red and the other yellow. It will make any dot(s) moved to create a ten more apparent in the model. When discussing with students the arrangements they create, focus on relationships of numbers. For example with 8 and 7, 8 is 2 less than 10 so two dots could be moved over to make 10 with 5 left over. Students will need much discussion to work with these ideas. Push students to make a 10 and discuss why it is helpful.

Students need **lots** of practice with this model both to understand more about how the numbers compose and decompose in friendly ways to compute more easily but also to learn how to represent the model more abstractly with numerals and symbols. Students must be able to both articulate what is happening and to also represent the actions and numerals using symbolic representation. It is helpful to work with one number at a time using different arrangements so students become proficient with all the arrangements for each quantity. Students must easily articulate the values and arrangements in order to be considered proficient.

Variations/Practice:

You can have students use base 10 blocks to create all the ways to make 15 with 2 addends and prove how they know. They write the expressions and correspond each numeral and symbol to the model. Ask: How many expressions were you able to make using the 10 rod? How come? What happened with the others?

Use single 10 frame cards and have students play 10 frame match in which they turn over cards to make 15. When they find a match they write the corresponding expression that makes 15 or whatever number given

References

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Coming to Know Number, by Grayson Wheatley, Second Edition, 2010.

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